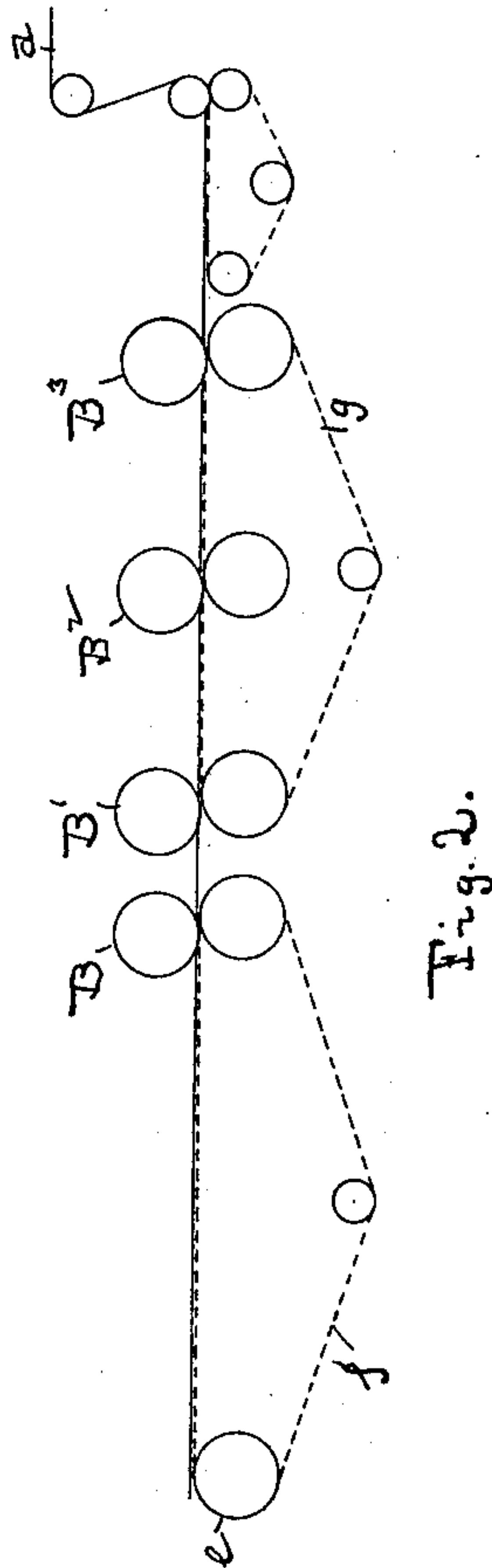
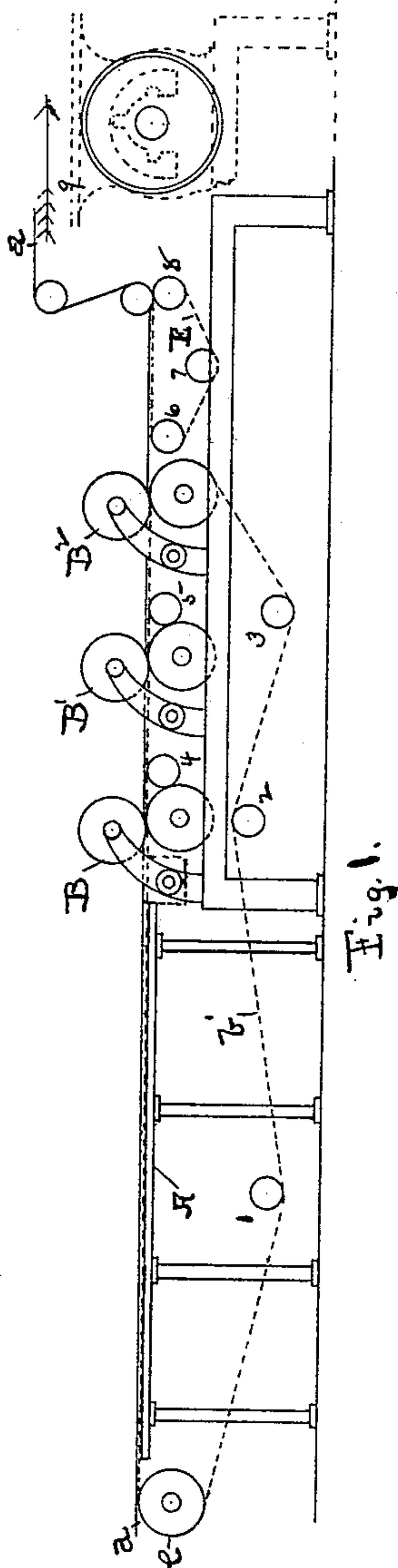


(No Model.)

J. T. FLOOD.
MACHINE FOR MAKING PAPER.

No. 403,744.

Patented May 21 1889.



WITNESSES:

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JOSEPH T. FLOOD, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO BUCHANAN, BOLT & CO., OF SAME PLACE.

MACHINE FOR MAKING PAPER.

SPECIFICATION forming part of Letters Patent No. 403,744, dated May 21, 1889.

Application filed October 22, 1887. Serial No. 253,089. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH T. FLOOD, of Holyoke, in the county of Hampden and Commonwealth of Massachusetts, have invented a new and useful Improvement in Machines for Making Paper, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to machines for making paper in which the web of paper is conducted from the tube-frame between two couch-rolls, thence between two or more sets of press-rolls, and so on to the driers, of which the well-known Fourdrinier machine is a type, and has for its object to remedy certain defects in such machines, by which the quality of the paper produced by them is impaired. As is well known, the pulp in such machines is carried upon a wire conveyer until it passes between the couch-rolls, when it is received upon a conveyer of felt, which takes it between the first pair of press-rolls, where a second felt receives it and passes it between the second pair of press-rolls. These felts when new have a nap of considerable length, and while this nap remains the paper passes between the press-rolls without detriment to its surface. The enormous wear upon the felt, however, soon destroys the nap upon its surface, and the paper is forced into the body of the felt as it passes between the press-rolls in such manner as to impress the outline of its surface within the surface of the paper and impair the quality of the latter. It is necessary, therefore, to renew the felts at frequent intervals at considerable expense, and each renewal entails a loss of time in the operation of the machine, which greatly augments the cost. Again, the use of said felts is open to the further objection that the gritty particles contained in the paper become embedded within their surface and soon render them practically impervious to water and seriously interfere with the action of the press-rolls in extracting the water from the paper. I have found that these objections can be obviated by discarding the press-rolls and felts entirely and increasing the number of couch-rolls, the paper being carried through said couch-rolls upon a wire conveyer, and

conducting the paper directly from the couch-rolls to the driers.

My invention therefore consists in a machine having a plurality of pairs of couch-rolls and a wire or wires to conduct the paper therethrough, as hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like letters designate like parts in the several figures, Figure 1 is a side elevation of a portion of a paper-machine having my invention applied thereto. Fig. 2 is a diagram illustrating a slightly-modified form of the invention.

Referring to Fig. 1, the letter A designates the tube-frame, and B the couch-rolls, of the ordinary Fourdrinier paper-machine, other parts of such machine being omitted, as they are well known and are not necessary to the illustration of my invention.

As heretofore constructed an endless wire apron, or "wire," as it is called, passes around a roll, *c*, at one end of the tube-frame and around the lower couch-roll, B, suitable intermediate guiding-rolls being provided, and the web of paper, *a*, in a plastic condition, is carried upon said wire along the tube-frame and through the couch-rolls, where it is received upon an endless apron of felt and carried between the first set of press-rolls, from which a second felt carries it through the second set of press-rolls, and so on to the driers, in a manner familiar to persons skilled in the art. As hereinbefore stated, there are serious objections to the use of said felts, and I have therefore devised a machine in which both the felts and the press-rolls are discarded and a plurality of sets of couch-rolls are utilized.

The letters B' B² designate, respectively, two additional sets of couch-rolls, which are mounted upon the frame of the machine in the same manner that the rolls B have heretofore been mounted thereon, and *b'* the wire, which is extended so that it passes between each of the two rolls of the three sets and passes around the lower roll of the set B², guide-rolls 1, 2, and 3 being suitably arranged, as shown, to retain said wire under proper tension. Rolls 4 and 5 are also preferably interposed between the sets of couch-rolls, as shown, to support the wire. When my in-

vention is applied to existing machines, by removing the press-rolls and felts and substituting therefor the plurality of couch-rolls, there will be a considerable distance between the last set of couch-rolls and the driers, and to afford a support for the paper in such cases I prefer to locate an apron, E, between said rolls and the driers, as shown, said apron being mounted upon three rolls, 6 7 8, to one of which positive motion is imparted in the usual manner. In constructing a new machine, however, the distance between said parts can be lessened, so that said apron may be dispensed with.

The paper, *a*, is carried upon the wire *b'*, between each of the sets of rolls B B' B² in succession, and, the wire permitting the water to escape from the paper freely, it is in a condition, when it emerges from between the last set, to pass directly to the driers, either with or without the intervening supporting-apron, as the case may be, as indicated by arrow 9. The paper is thus passed to the driers without liability of having its surface impaired by worn-out felts, and the cost of frequent renewals of the felts is avoided.

In Fig. 2 I have shown as a modification four sets of couch-rolls instead of three, and have illustrated in connection therewith the use of two wires instead of one, the wire *f* corresponding to the usual wire as used heretofore, and wire *g* being a short wire operating in connection with the additional couch-rolls.

By the use of the additional wire my invention can be applied to existing machines without disturbing the wire previously used thereon, and said additional wire can be used in connection with the two sets of additional couch-rolls shown in Fig. 1 in the same manner as shown in connection with the three sets in Fig. 2.

I have illustrated the four sets of rolls in Fig. 2, for the reason that the number of such sets which can be employed in addition to the first set as used on such machines heretofore can be varied within the spirit of my invention; but for practical purposes I regard the use of three sets of rolls, as shown in Fig. 1, as being preferable.

The fact that the plurality of couch-rolls are capable of accomplishing the function of the heavier press-rolls in extracting the water from the paper is due to the great facility with which the water passes through the wire as compared with the felts employed with press-rolls.

An additional advantage gained by the use of a wire, as herein described, in the place of felts is that the former is kept clean by the passage through it of the water extracted

from the paper, whereas the latter are soiled and rendered injurious to the surface of the paper by the gritty particles and other impurities deposited upon them, and which can be removed only at the expense of much time and labor.

While the meshes of the wire usually employed on paper-machines are sufficiently open to permit the water to escape freely therethrough, as just described, they are so small that the only mark left thereby upon the paper is upon the extreme surface of the latter, and such marks are obliterated by the action of the calenders after the paper passes the driers.

It will be observed from the foregoing description that by a simple and inexpensive change of construction I am enabled to overcome grave defects in paper-making machines as heretofore made.

It is obvious that modifications other than those hereinbefore mentioned can be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the tube-frame and driers of a machine for making paper, of a plurality of pairs of couch-rolls located between said tube-frame and driers in such manner that the web of paper passes directly from the last pair of said rolls to the driers, and a wire serving to carry the web over said tube-frame and between each of said pairs of couch-rolls, arranged and operating substantially as described, whereby the use of press-rolls and felts is avoided.

2. In a machine for making paper, the combination, with roll *e*, of the three sets of couch-rolls B, B', and B², and wire *b'*, passing around roll *e* and the lower roll of set B² and between the upper and lower rolls of sets B B', substantially as and for the purpose set forth.

3. In a machine for making paper, the combination, with roll *e*, couch-rolls B B' B², and wire *b'*, arranged and operating substantially in the manner described, of rolls 6 7 8 and apron E, mounted upon said rolls, substantially as and for the purpose set forth.

4. In a machine for making paper, the combination, with roll *e*, couch-rolls B B' B², supporting and guiding rolls 1 2 3 4 5, and wire *b'*, arranged and operating substantially as described, of rolls 6 7 8 and apron E, mounted thereon, substantially as and for the purpose set forth.

JOSEPH T. FLOOD.

Witnesses:

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H. K. HAWES.